

Test Report

Report No.: MTi190920E065

Date of issue: Sep. 20, 2019

Sample Description: wireless charger

Model(s): W22-W

Applicant:

Address:

Date of Test: Sep. 09, 2019 to Sep. 20, 2019

Shenzhen Microtest Co., Ltd.
<http://www.mtitest.com>



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Test Result Certification	
Applicant's name:	
Address:	
Manufacture's Name:	
Address:	
Product name:	wireless charger
Trademark:	N/A
Model name:	W22-W
Standards:	EN 55032:2015 EN 55024:2010 EN 61000-3-2:2014 EN61000-3-3:2013

This device described above has been tested by Shenzhen Microtest Co., Ltd. and the test results show that the equipment under test (EUT) is in compliance with the EMC requirements. And it is applicable only to the tested sample identified in the report.

Tested by:

Amy Lu

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Sep. 20, 2019

Reviewed by:

Smith Chen

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Sep. 20, 2019

Approved by:

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Sep. 20, 2019

Summary of Test Result

Item	Description of Test	Result
EN 55032		
1	Conducted emission	Pass
2	Radiated emission	Pass
EN 61000-3-2 & EN 61000-3-3		
1	Harmonic current emission	N/A*
2	Voltage fluctuations & flicker	Pass
EN 55024		
1	Electrostatic discharge immunity (ESD)	Pass
2	Radiated electromagnetic field immunity (RS)	Pass
3	Fast transients / burst immunity (EFT)	Pass
4	Surge immunity	Pass
5	Conducted disturbance immunity (CS)	Pass
6	Voltage interruptions & voltage Dips	Pass
7	Power frequency magnetic fields (PFMF)	N/A*

* Not applicable, this test item is not applicable.

1 General description

1.1 Feature of equipment under test (EUT)

Product name:	wireless charger
Model name:	W22-W
Power source:	DC 5V form AC 230V/50Hz
Specification:	Input: DC 5V 2A Output: DC 5V 1A

1.2 Test mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test mode	Description
Mode 1	Wireless charging

NOTE: The test modes were carried out for all operation modes. The final test mode of the EUT was the worst test mode for EMI, and its test data is showed.

1.3 Test conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 20°C~30°C
- Humidity: 30%~70% (30%~60% for ESD test)
- Atmospheric pressure: 98kPa~101kPa

1.4 EUT test setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

1.5 Ancillary equipment

Equipment	Model	S/N	Manufacturer
Adapter	D31-05050100E	/	/

1.6 Measurement Uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, $U=2 \times U_c(y)$

Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	± 1 degree
Humidity	± 5 %

2 Testing site

Test Site	Shenzhen Microtest Co., Ltd.
Test Site Location	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868

3 List of test equipment

Emission test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
LISN	Schwarzbeck	NSLK8127	#841	2019/9/25
LISN	Laplace	LISN-16A	003420	2019/11/4
EMI Test Receiver	Rohde&schwarz	ESCI3	101368	2019/11/12
Broadband TRILOG Antenna	Schwarzbeck	VULB9163	9163-872	2019/11/16
Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1145	2019/11/14
Amplifier	HP	8447D	3113A06150	2019/11/12
Amplifier	Agilent	8449B	3008A02400	2020/8/21
EMI Test Receiver	R&S	ESPI	100314	2019/11/12
Spectrum analyzer	Agilent	E4407B	MY41441082	2019/11/4
Harmonics, Flicker & Power Analyser	Laplace	AC 2000A	311216	2019/11/12

Immunity test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
ESD Generator	Schloder	SESD 3000	509325	2019/11/16
Surge Generator	HTEC	HCWG 51	153702	2019/11/12
EFT Generator	HTEC	HEFT 51	153701	2019/11/12
Cycle SAG Simulator	Prima	DRP61011AG	PR15056303	2019/11/12
Conducted Disturbances Test System	Schloder	CDG-6000-25	126A1343/2015	2019/11/12
CDN	Schloder	CDN-M2+3	A2210332/2015	2019/11/12
Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2019/11/14
Signal Generator	Agilent	E4438C	MY49070163	2019/11/4
Power Amplifier	AR	25S1G4A	308598	2019/11/4
Power Frequency Magnetic Field Simulators	HTEC	HPFMF 100	153703	2019/11/12

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

4 EMC emission test

4.1 Conducted emission

4.1.1 Limits

Frequency (MHz)	Class A (dBμV)		Class B (dBμV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79	66	66 - 56 *	56 - 46 *
0.5 -5	73	60	56	46
5 -30	73	60	60	50

Note 1: the tighter limit applies at the band edges.

Note 2: the limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

4.1.2 Test Procedures

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

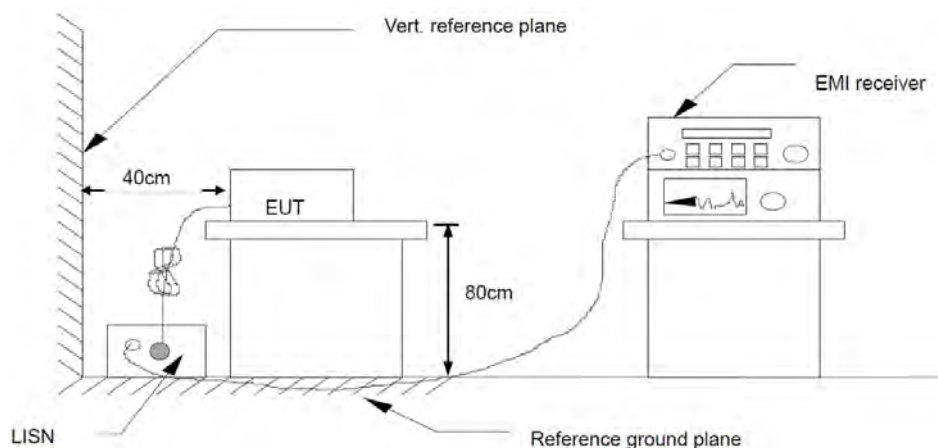
Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN is at least 80 cm from nearest part of EUT chassis.

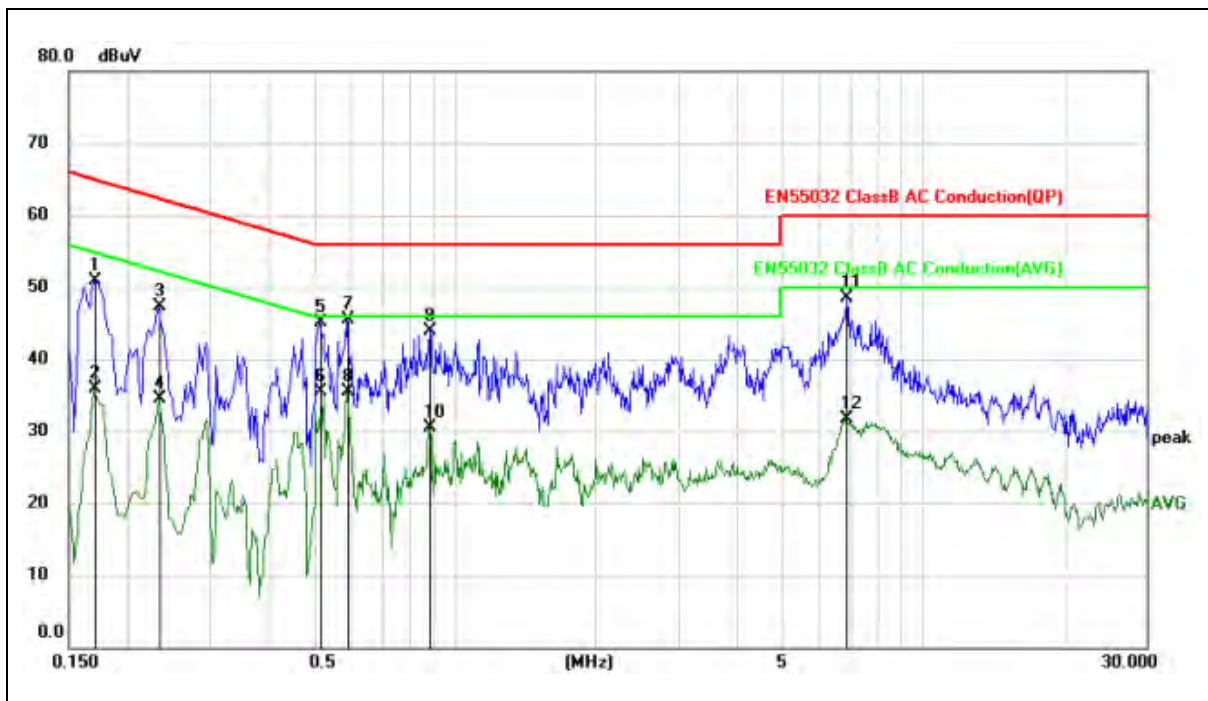
For the actual test configuration, please refer to the related Item – photographs of the test setup.

4.1.3 Test setup



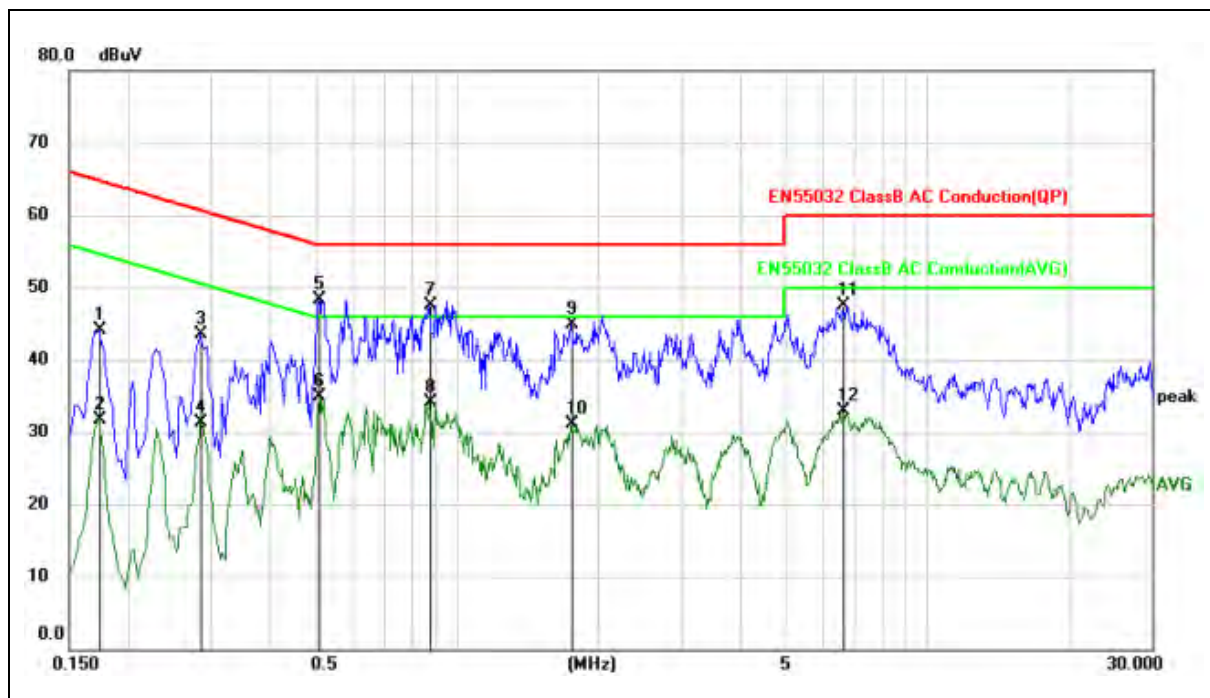
4.1.4 Test Result

Temperature:	24℃	Relative Humidity:	48%
Pressure:	101kPa	Phase:	L
Test voltage:	AC 230V 50Hz	Test mode:	Mode 1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1700	50.96	-0.03	50.93	64.96	-14.03	QP	
2		0.1700	35.96	-0.03	35.93	54.96	-19.03	AVG	
3		0.2340	47.37	-0.03	47.34	62.31	-14.97	QP	
4		0.2340	34.60	-0.03	34.57	52.31	-17.74	AVG	
5		0.5180	45.05	-0.03	45.02	56.00	-10.98	QP	
6		0.5180	35.44	-0.03	35.41	46.00	-10.59	AVG	
7	*	0.5899	45.58	-0.03	45.55	56.00	-10.45	QP	
8		0.5899	35.53	-0.03	35.50	46.00	-10.50	AVG	
9		0.8820	43.88	-0.04	43.84	56.00	-12.16	QP	
10		0.8820	30.58	-0.04	30.54	46.00	-15.46	AVG	
11		6.8460	48.64	-0.04	48.60	60.00	-11.40	QP	
12		6.8460	31.74	-0.04	31.70	50.00	-18.30	AVG	

Temperature:	24℃	Relative Humidity:	48%
Pressure:	101kPa	Phase:	N
Test voltage:	AC 230V 50Hz	Test mode:	Mode 1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1740	44.05	-0.03	44.02	64.77	-20.75	QP	
2		0.1740	31.74	-0.03	31.71	54.77	-23.06	AVG	
3		0.2860	43.59	-0.03	43.56	60.64	-17.08	QP	
4		0.2860	31.33	-0.03	31.30	50.64	-19.34	AVG	
5	*	0.5100	48.37	-0.03	48.34	56.00	-7.66	QP	
6		0.5100	34.95	-0.03	34.92	46.00	-11.08	AVG	
7		0.8780	47.59	-0.04	47.55	56.00	-8.45	QP	
8		0.8780	34.17	-0.04	34.13	46.00	-11.87	AVG	
9		1.7500	44.99	-0.04	44.95	56.00	-11.05	QP	
10		1.7500	31.05	-0.04	31.01	46.00	-14.99	AVG	
11		6.6060	47.50	-0.04	47.46	60.00	-12.54	QP	
12		6.6060	33.00	-0.04	32.96	50.00	-17.04	AVG	

4.2 Radiated emission

4.2.1 Limits

Frequency (MHz)	Class A (at 3m) dB μ V/m		Class B (at 3m) dB μ V/m	
	Quasi-peak		Quasi-peak	
30-230	50		40	
230-1000	57		47	
/	Peak	Average	Peak	Average
1000-3000	76	56	70	50
3000-6000	80	60	74	54

4.2.2 Test Procedures

The radiated emission tests were performed in the 3 meters.

The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.

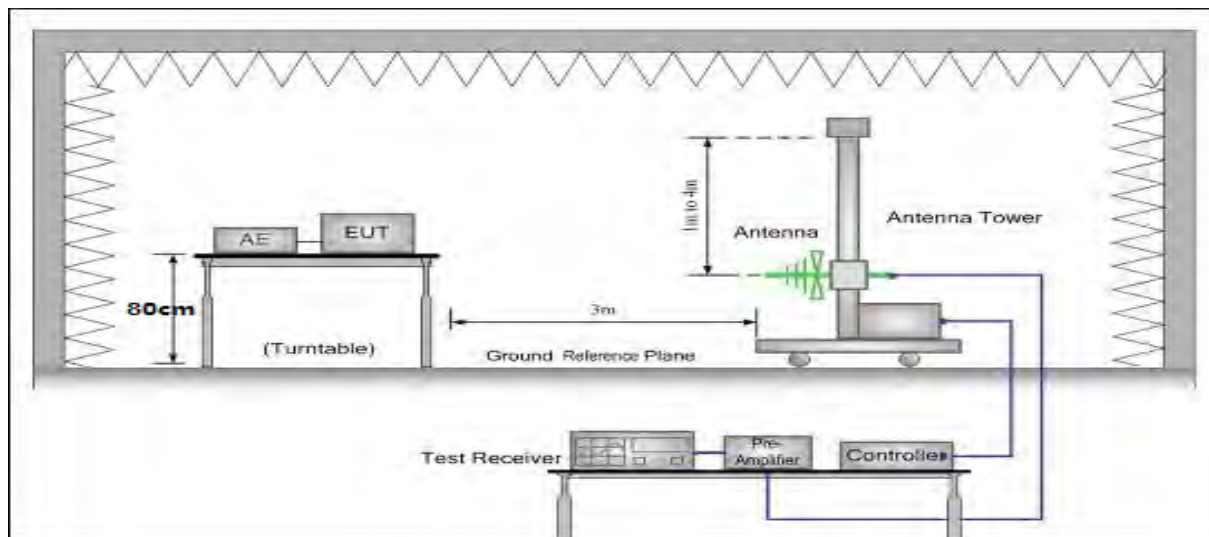
The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

If the peak mode measured value compliance with and lower than quasi peak mode limit, the EUT shall be deemed to meet QP limits and then no additional QP mode measurement performed.

If the peak mode measured value compliance with and lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.

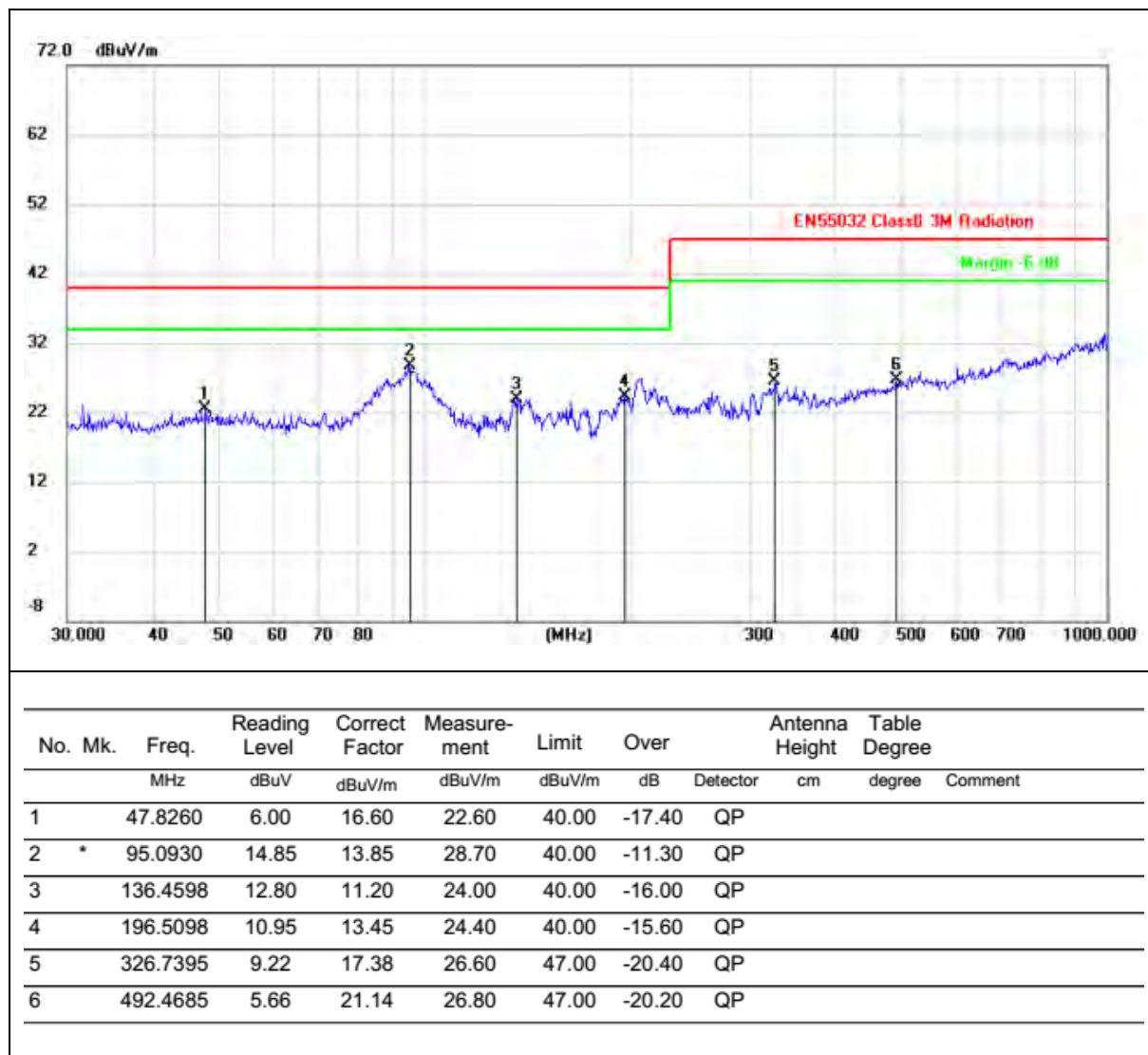
For the actual test configuration, please refer to the related item – EUT test photos.

4.2.3 Test Setup

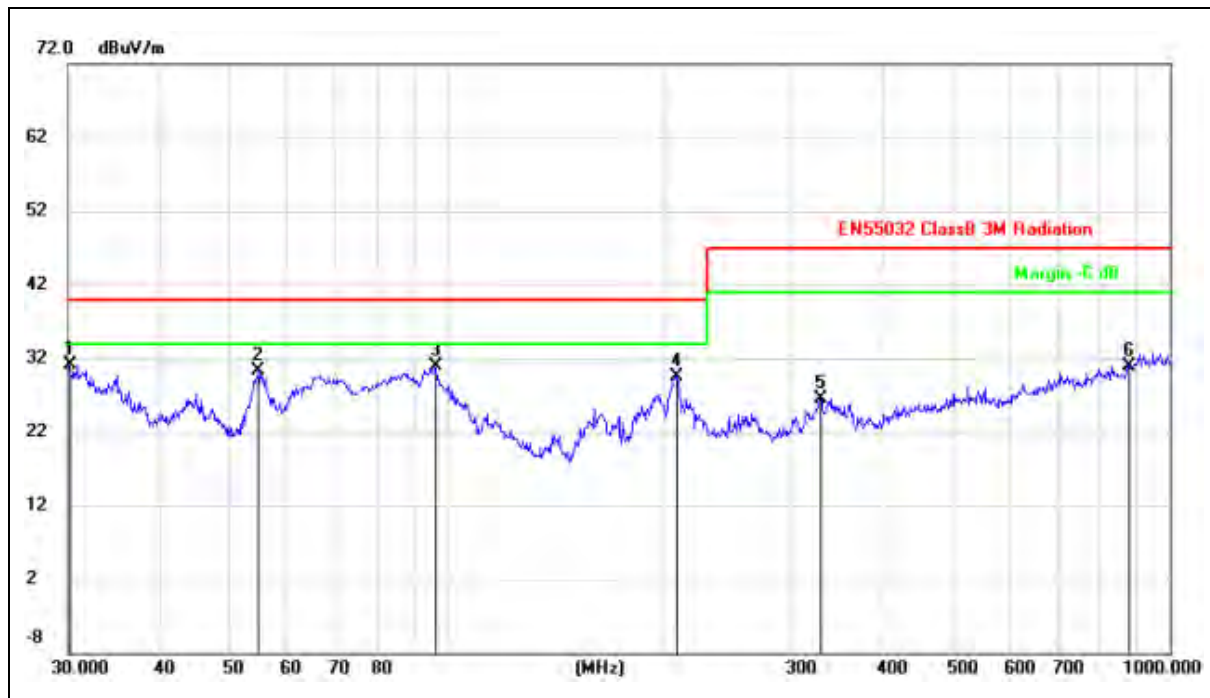


4.2.4 Test Result

Temperature:	25°C	Relative Humidity:	38%
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	AC 230V 50Hz	Test mode:	Mode 1



Temperature:	25°C	Relative Humidity:	38%
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	AC 230V 50Hz	Test mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	30.1054	16.30	14.80	31.10	40.00	-8.90	QP		
2		55.0274	14.56	15.84	30.40	40.00	-9.60	QP		
3		96.4362	16.82	14.08	30.90	40.00	-9.10	QP		
4		207.8501	14.39	15.21	29.60	40.00	-10.40	QP		
5		329.0390	9.06	17.44	26.50	47.00	-20.50	QP		
6		875.2470	5.90	25.10	31.00	47.00	-16.00	QP		

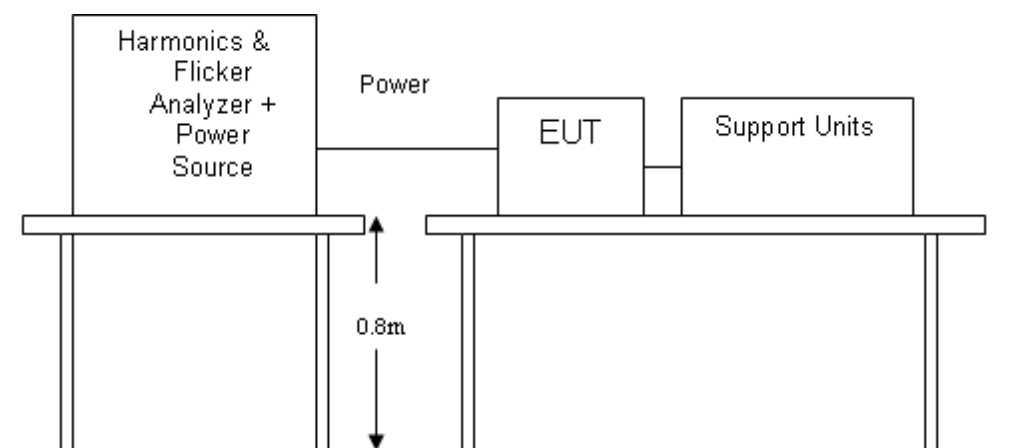
4.3 Harmonic current emission / Voltage fluctuations & flicker

4.3.1 procedures

The EUT was installed and placed on a non-conductive table and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The correspondent test program of test instrument to measure the current harmonics / voltage fluctuations & flicker emanated from EUT. The measure time shall be not less than the time necessary for the EUT to be exercised.

4.3.2 Test setup



4.3.3 Test result

Temperature:	25°C	Relative Humidity:	46%
Pressure:	101kPa	Test mode:	Mode 1

Harmonic current emission:

N/A

the rated power is below 75W.

Voltage fluctuations & flicker:

	Pst	dc (%)	dmax (%)	d(t) > 3.3% (ms)
Limit	1.000	3.300	4.000	500
Reading	0.11	0.19	0.83	0

5 Immunity test

5.1 Performance criteria

Performance criterion A:

During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Performance criterion B:

After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Performance criterion C:

During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Particular performance criteria:

The particular performance criteria which are specified in the normative annexes take precedence over the corresponding parts of the general performance criteria.

Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.

5.2 Electrostatic discharge immunity (ESD)

5.2.1 Test Procedures

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

Contact discharge was applied to conductive surfaces and coupling planes of the EUT. During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

Vertical Coupling Plane (VCP):

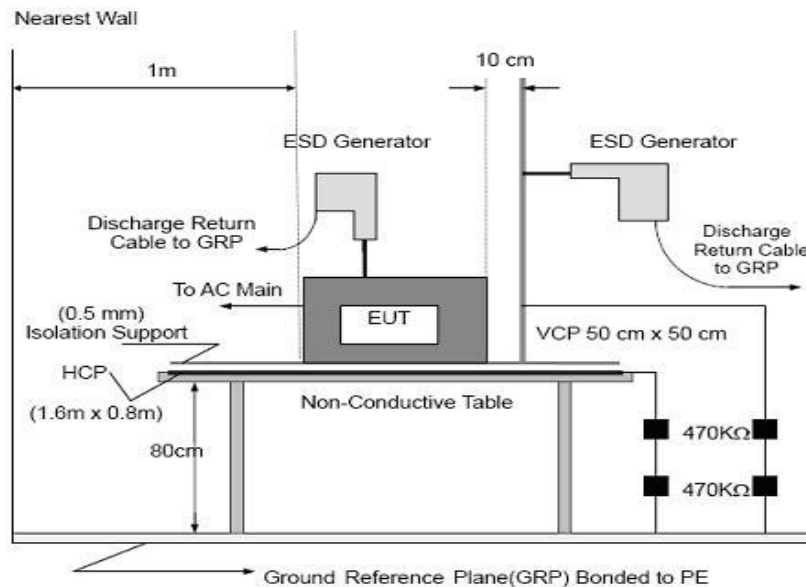
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

Air discharges at insulation surfaces of the EUT. It was at least ten single discharges with positive and negative at the same selected point. For the actual test configuration, please refer to the related Item –EUT Test Photos.

5.2.2 Test Setup



5.2.3 Test Result

Temperature:	25℃	Relative Humidity:	46%
Pressure:	101kPa	Test mode:	Mode 1

Indirect discharge

Test Point	Contact discharge level (kV)	Number and polarity	Criterion met	Criterion Required
1. VCP-Front side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	B
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	
2.VCP-Rear side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	
3.VCP-Left side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	
4. VCP-Right side	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	
5. HCP	<input type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	A	

Result: Compliance.

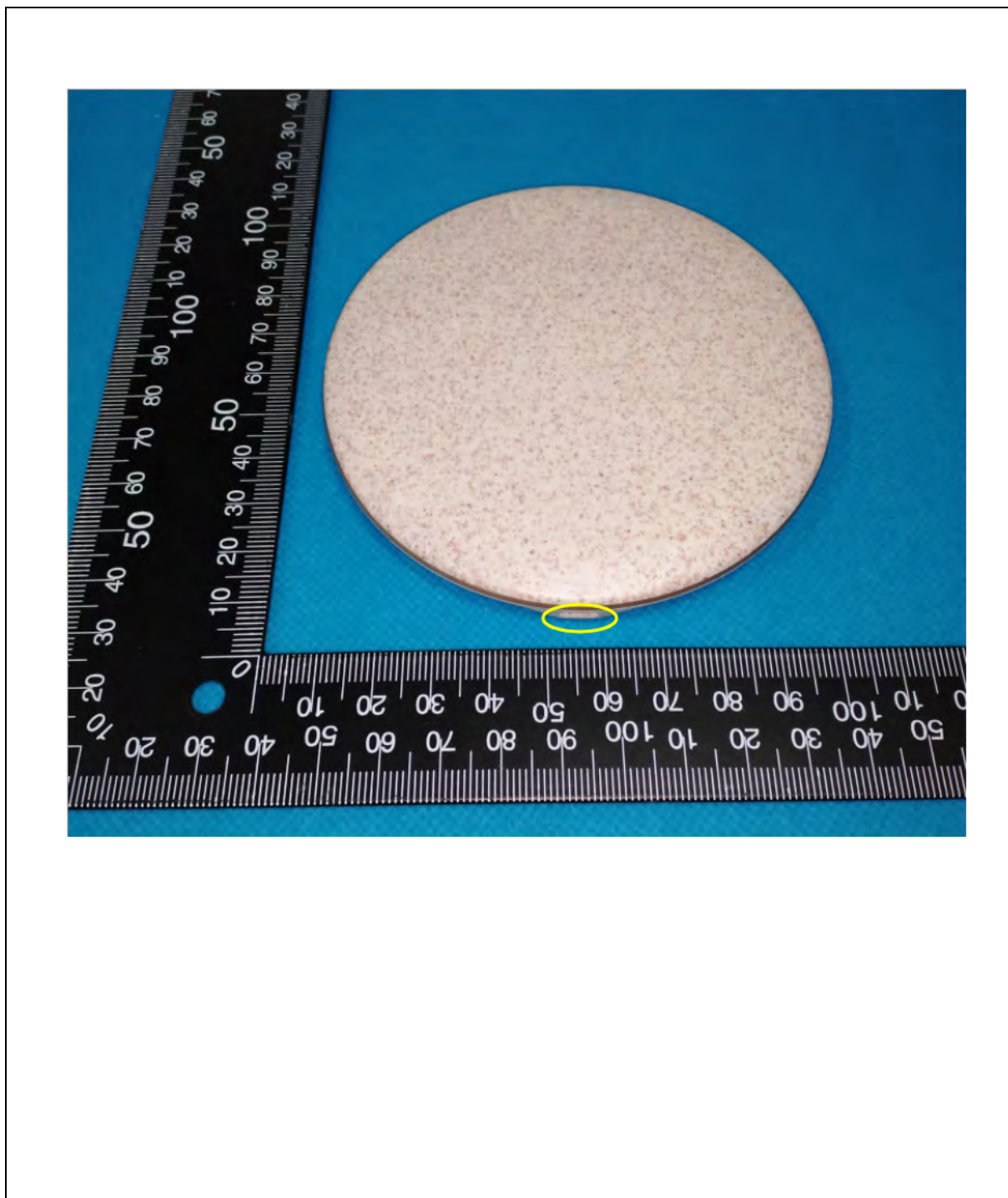
Direct discharge

Test Point	Contact discharge level (kV)	Air discharge level (kV)	Number and polarity	Criterion met	Criterion Required
1. Each nonconductive location touchable by hand	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	<input checked="" type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	25 (+)	A	B
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input checked="" type="checkbox"/> ..8	25 (-)	A	
1. Each conductive location touchable by hand	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	25 (+)	N/A	
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	25 (-)	N/A	

Note1: Please see the photographs below about the details of test points.

Result: compliance.

Test location (Transmitter):



Note: Yellow circle for Air Discharge; Red circle for Contact Discharge.

5.3 Radiated electromagnetic field immunity (RS)

5.3.1 Test Procedures

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

The other condition as following manner:

The field strength level was 3V/m.

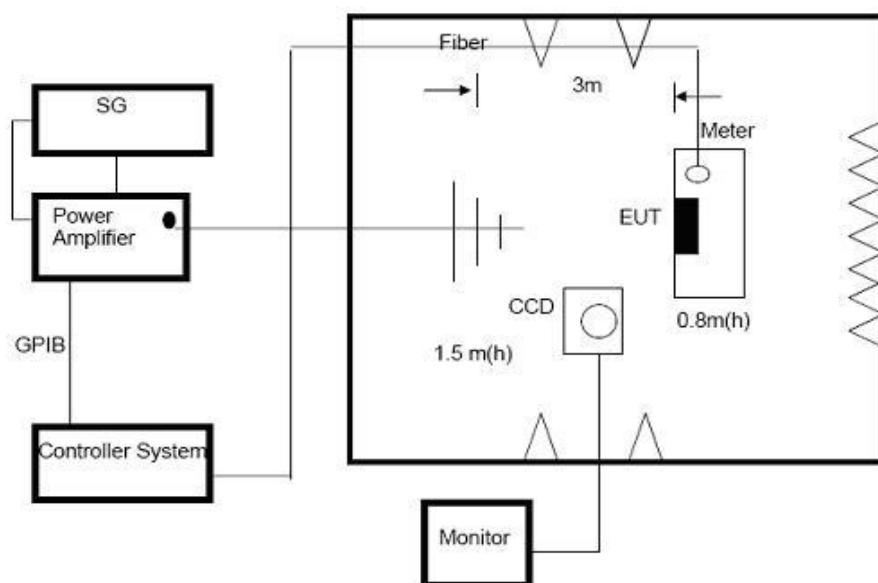
The frequency range is swept from 80 MHz to 1000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

For the actual test configuration, please refer to the related Item –EUT Test Photos.

5.3.2 Test setup



5.3.3 Test Result

Temperature:	25°C	Relative Humidity:	48%
Pressure:	101kPa	Test mode:	Mode 1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform. Criteria	Results	Judgment
80~1000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	A	Pass
			Rear			
			Left			
			Right			

5.4 Fast transients / burst immunity (EFT)

5.4.1 Test Procedures

The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

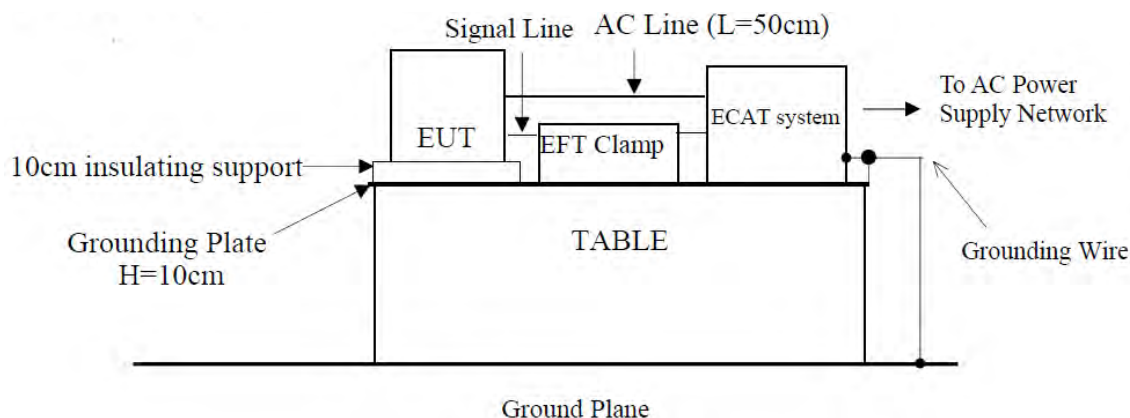
For input and AC power ports:

The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can't less than 1min.

For signal lines and control lines ports:

Ports which are intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks, local area networks and similar networks.)

5.4.2 Test Setup



5.4.3 Test Result

Temperature:	25℃	Relative Humidity:	48%
Pressure:	101kPa	Test mode:	Mode 1

Port Type	Injected Line	Test Voltage	Criterion met	Criterion Required
AC Mains	L	±1kV	A	B
	N	±1kV	A	
	L+N	±1kV	A	
	PE	±1kV	N/A	
	L+PE	±1kV	N/A	
	N+PE	±1kV	N/A	
	L+N+PE	±1kV	N/A	

5.5 Surge immunity

5.5.1 Test Procedures

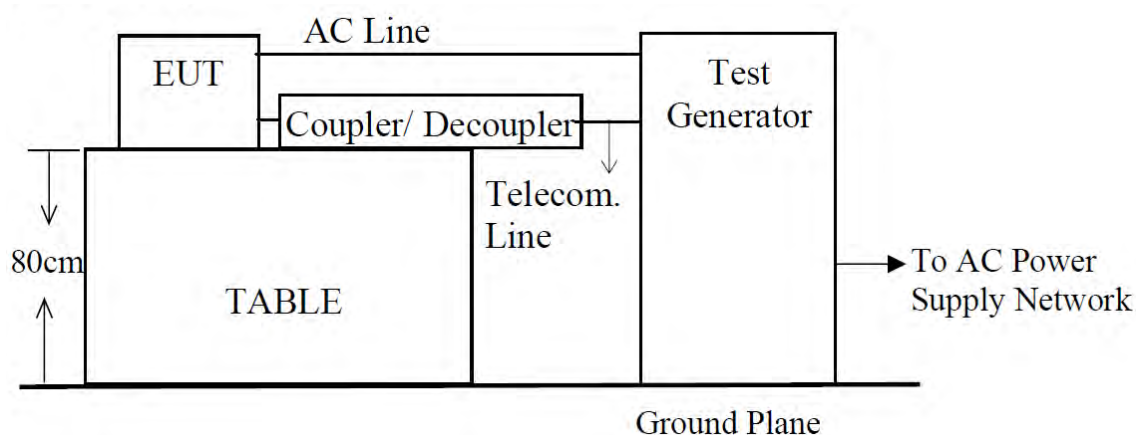
For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV.

At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.

Different phase angles are done individually.

Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

5.5.2 Test Setup



5.5.3 Test Result

Temperature:	25°C	Relative Humidity:	48%
Pressure:	101kPa	Test mode:	Mode 1

Port Type	Injected Line	Test Voltage	Criterion met	Criterion Required
AC Mains	L – N	±1kV	A	B
	L – PE	±2kV	N/A	
	N – PE	±2kV	N/A	
	L+N – PE	±2kV	N/A	

5.6 Conducted disturbance immunity (CS)

5.6.1 Test Procedures

The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

The disturbance signal described below is injected to EUT through CDN.

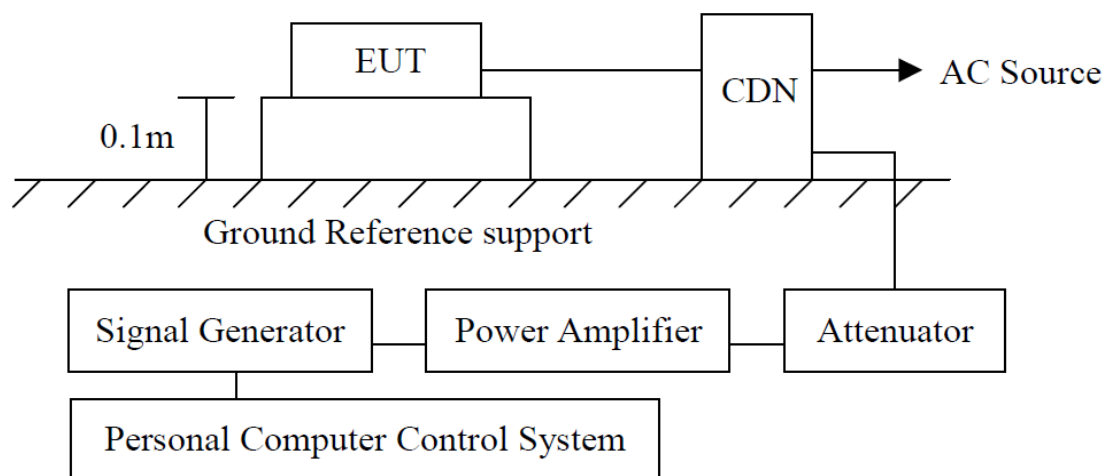
The EUT operates within its operational mode(s) under intended climatic conditions after power on.

The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.

The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

5.6.2 Test Setup



5.6.3 Test Result

Temperature:	25℃	Relative Humidity:	48%
Pressure:	101kPa	Test mode:	Mode 1

Port Type	Frequency (MHz)	Test Voltage	Criterion met	Criterion Required
AC Mains	0.15 to 80	3 V (rms) AM Modulated 1000Hz, 80%	A	A

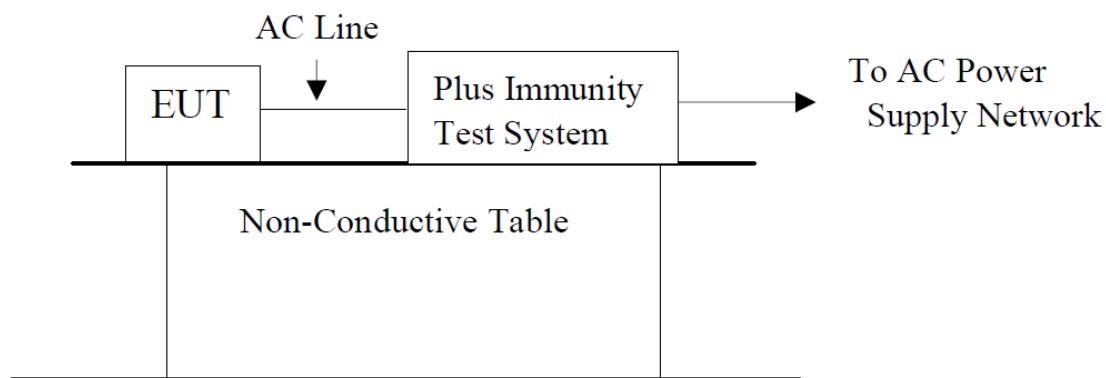
5.7 Voltage interruptions voltage Dips

5.7.1 Test procedures

The interruptions are introduced at selected phase angles with specified duration.

Record any degradation of performance

5.7.2 Test setup



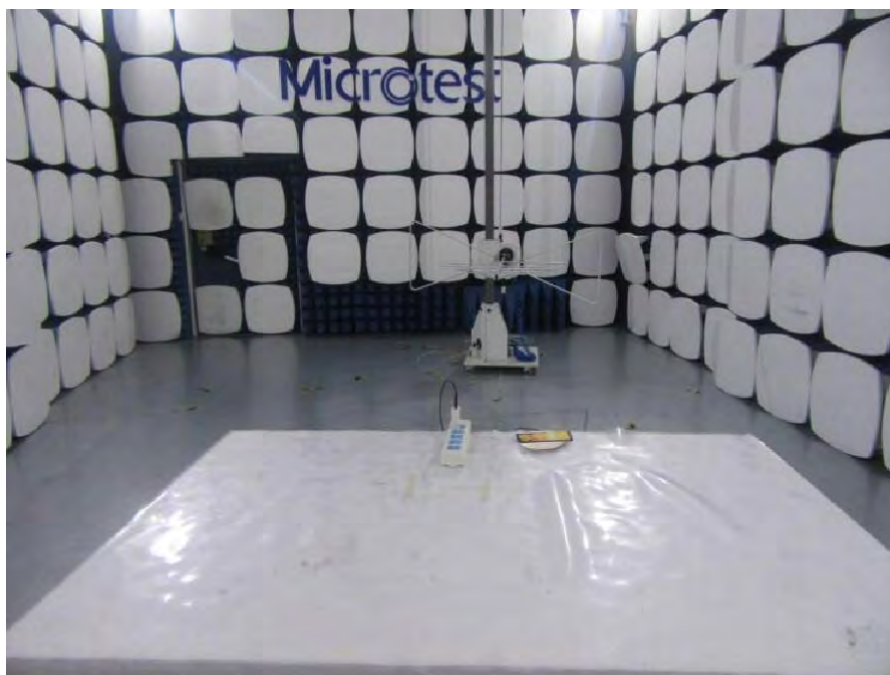
5.7.3 Test result

Temperature:	25°C	Relative Humidity:	48%
Pressure:	101kPa	Test mode:	Mode 1

Test Level in %U _T	Period	Criterion	Result
0%	0.5	B	A
70%	25	C	A
0%	250	C	C

Photographs of the Test Setup

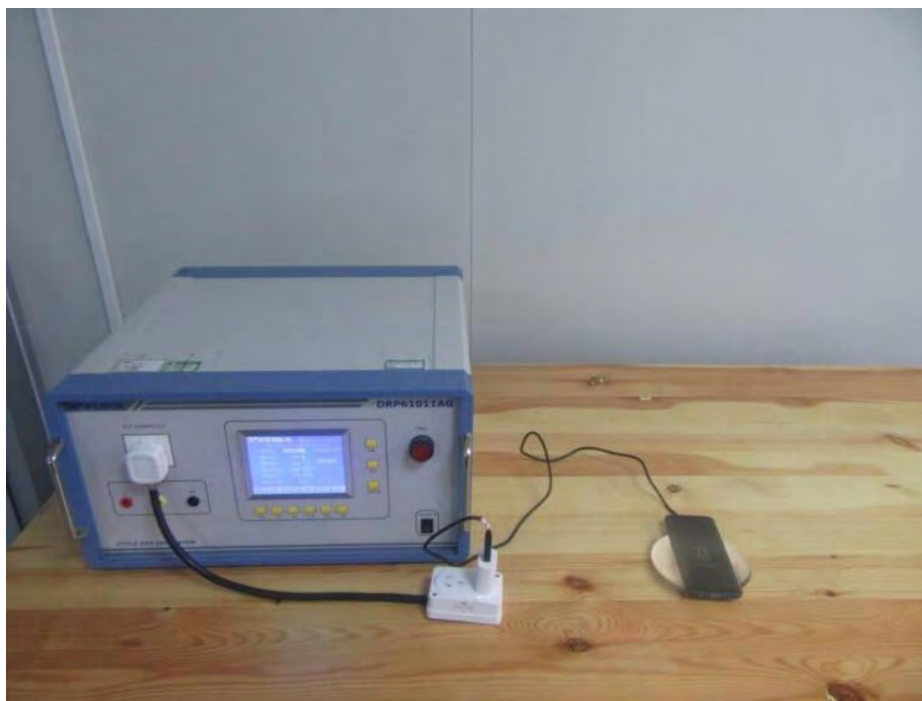
Radiated emission



Conducted emission



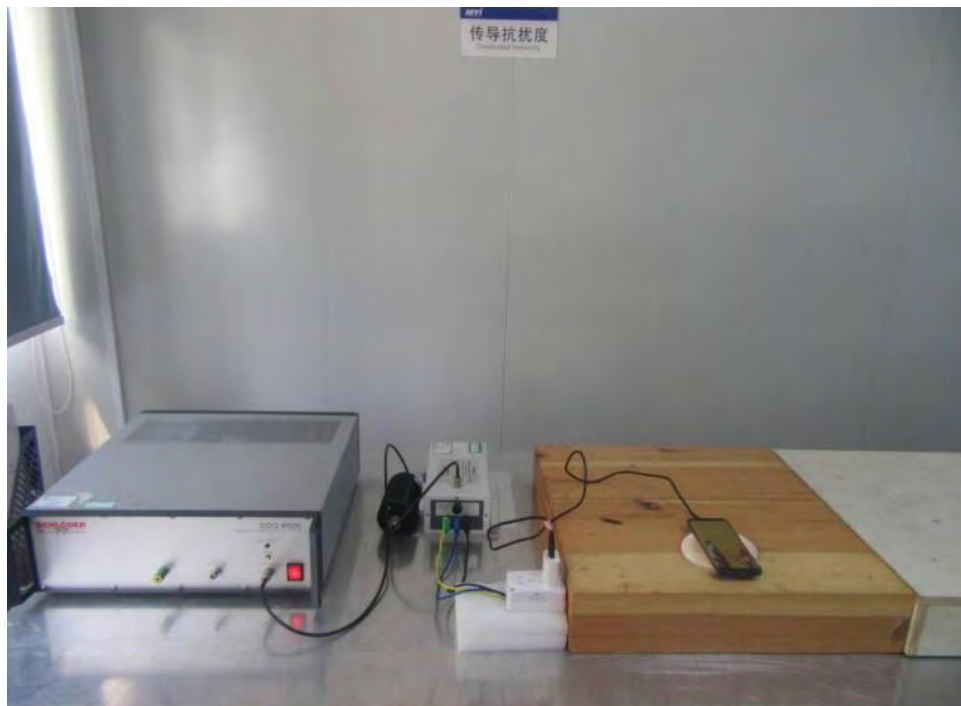
Dips



Surges



CS



ESD



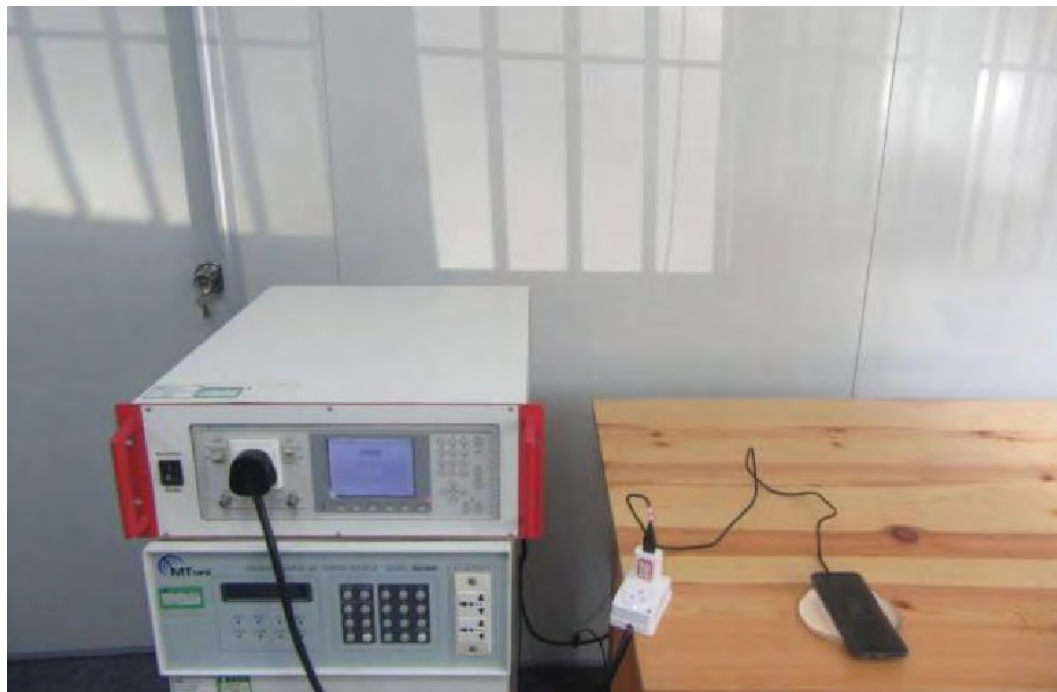
EFT



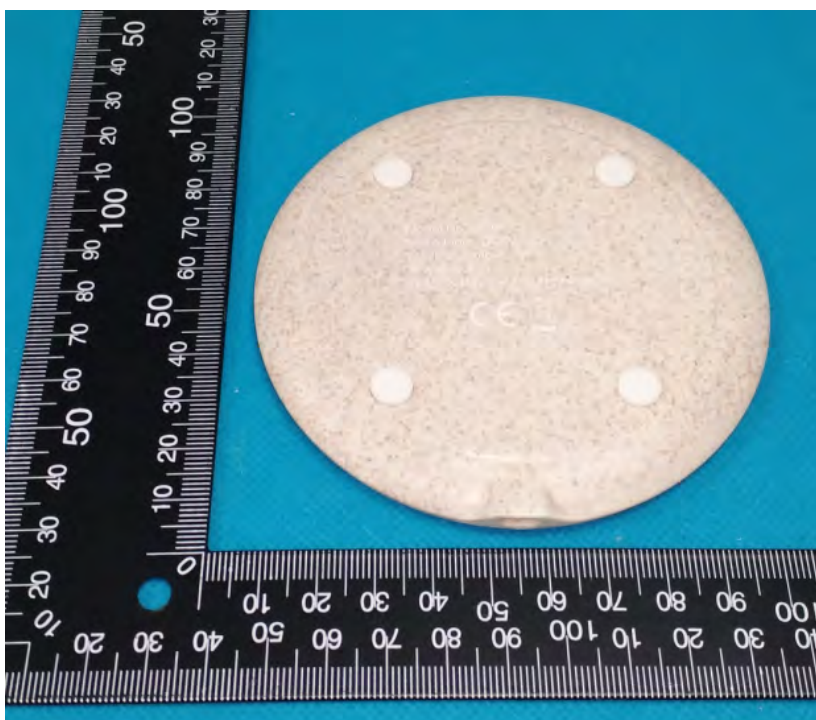
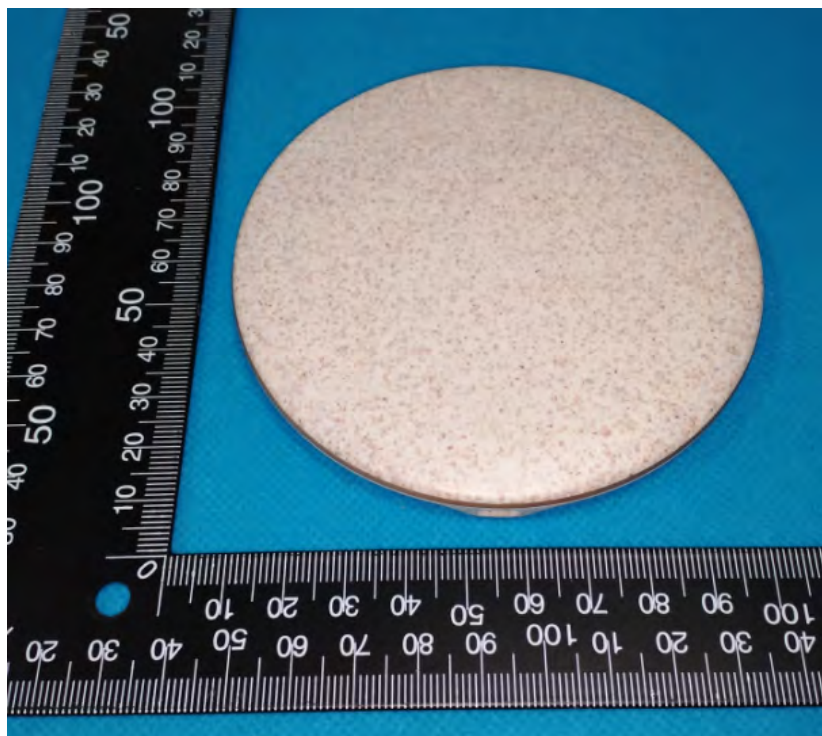
RS

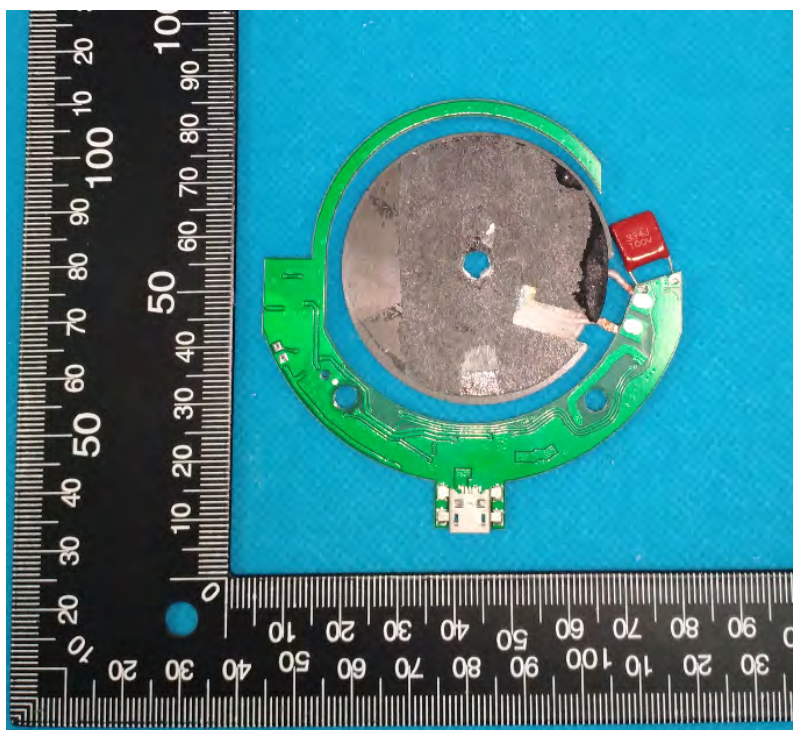
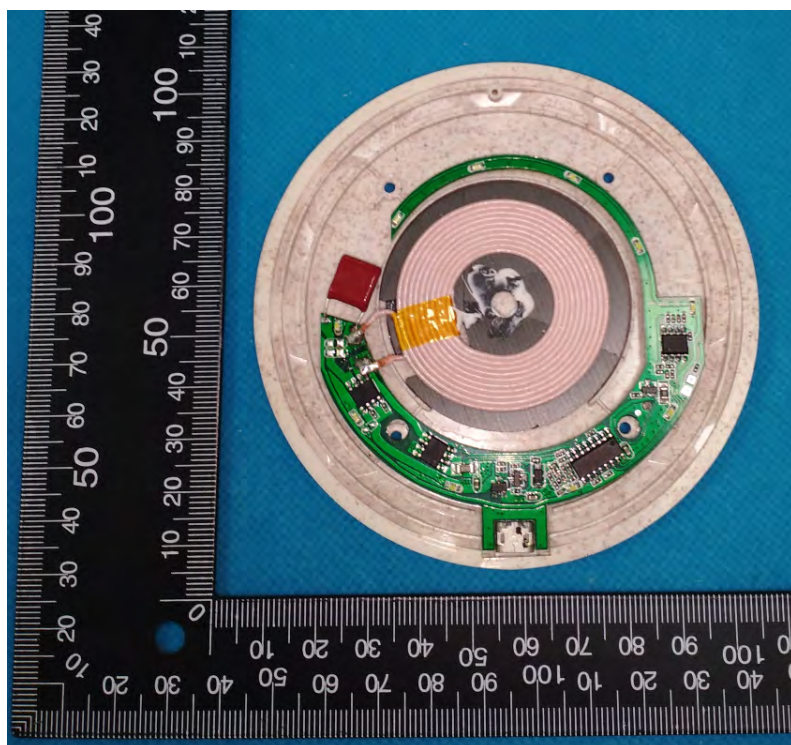


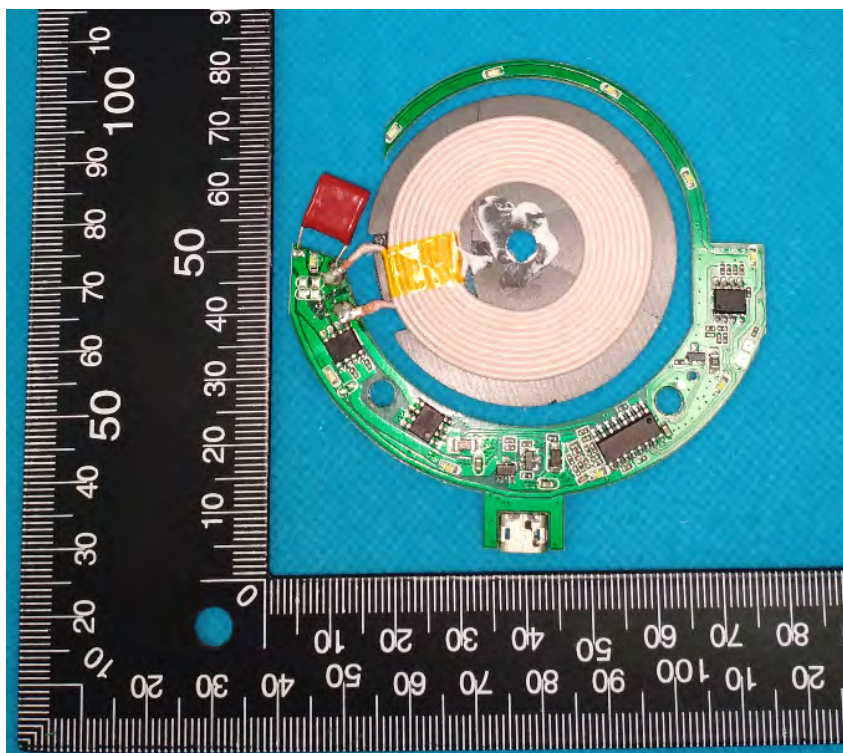
Harmonic & flicker



Photographs of the EUT







----End of Report----